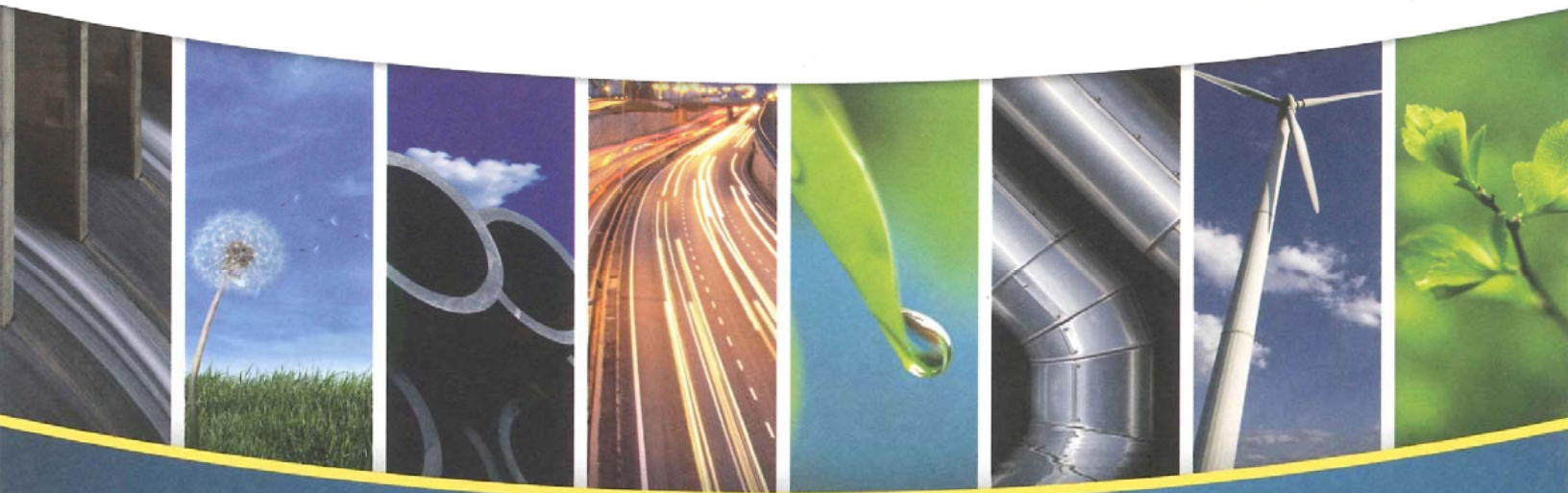


Howard Street Housing Development Transport Impact Assessment

Hastings District Council

APRIL 2016



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QUALITY STATEMENT

PROJECT MANAGER

Joanna Davenport

PROJECT TECHNICAL LEAD

Shane Turner

PREPARED BY


Shaun Boshier


CHECKED AND REVIEWED BY

Shane Turner

APPROVED FOR ISSUE BY

Shane Turner

.....  14/04/2016

.....  14/04/2016

.....  14/04/2016

CHRISTCHURCH

Hazeldean Business Park, 6 Hazeldean Road, Addington, Christchurch 8024
PO Box 13-249, Armagh, Christchurch 8141
TEL +64 3 366 7449, FAX +64 3 366 7780

REVISION SCHEDULE

Rev No	Date	Description	Signature or Typed Name (documentation on file).		
			Prepared by	Checked and Reviewed by	Approved by
1	April 16	Final	S Boshier	S Turner	S Turner

Hastings District Council

Howard Street Housing Development

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APPENDICES

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1 Introduction

Hastings District Council (HDC) has brought forward into their current 2015-25 Long Term Plan (LTP) the possibility of rezoning rural land in between Howard Street and Havelock Road, in the southwest of Hastings. Residential development of this land is expected if the land is rezoned from its current 'Plains Production' designation to 'Hastings General Residential'.

This report has been prepared on behalf of HDC to provide a description of the existing transportation environment, outline any known details of the proposed development for Howard Street and evaluate the impacts of this development on two nearby intersections. It is not a full Traffic Impact Assessment and sits below that level of investigation.

2 Proposed Development Site

The proposed greenfield residential housing development is located south-east of Hastings CBD. It adjoins Havelock Road, which is the main road route between Hastings and Havelock North. No access is proposed from Havelock Road, only Howard Street. Figure 2-1 presents an aerial view of the proposed development site.

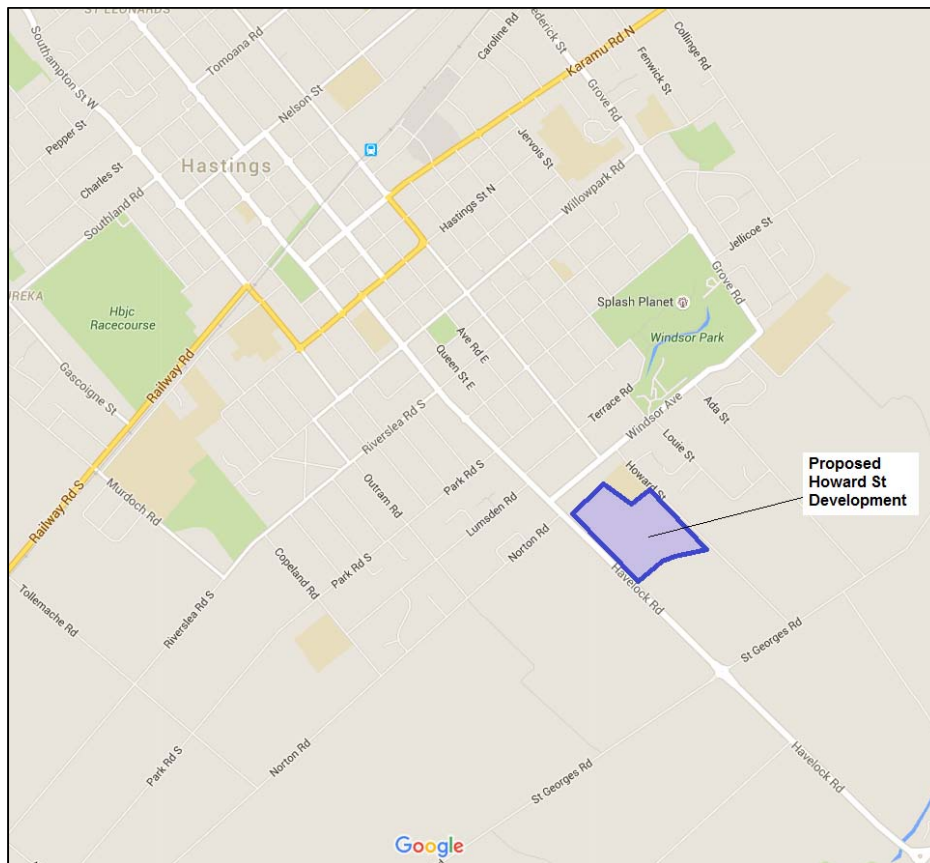


Figure 2-1: Proposed Development Site

3 Existing Transport Environment

3.1 Road Network

Access to the proposed development is via Howard Street only. The majority of traffic generated will be travelling to and from Hastings CBD using Windsor Avenue and St Aubyn Street East. Hence the

focus of this section is on these three roads. The lower flow movements to Havelock North will be via St Georges Road and either Havelock Road or Ada Street. The traffic effects on these roads and intersections are expected to be minor.

3.1.1 Howard Street

Howard Street is classified as a 'District Collector Route' by HDC. The speed limit changes from 80 km/h to 50 km/h 500m south of Windsor Avenue, with the 80km/h speed zone designated as a 'Safer Speed Area' and is signed as such. It is a two lane road with parallel parking on both sides of the road for most of the 50 km/h section.

There is traffic calming road markings near Parkvale School at the northern end, along with appropriate signage as per Figure 3-1. At the give way intersection with Windsor Avenue a small island was constructed in mid-2015, which now permits space for pedestrians to wait and cross Howard St in two motions. A consequence of this island is that the space for vehicles exiting Howard Street has been constricted as shown in Figure 3-2 and is likely to increase queuing in the AM peak. A kea crossing is located outside the school 130m south of Windsor Avenue.



Figure 3-1: Howard Street traffic calming line marking outside Parkvale School (June 2015 – Google)



Figure 3-2: Howard Street / Windsor Ave intersection (June 2015 – Google)

The HDC network traffic count database has one 2008 count for Howard Street. This shows a volume of 1,550 vehicles (1,600 est.), an 85th percentile speed of 58 km/h and that there are 3% HCV. The count site location was located within the first 224m of the road, which is at the northern end of Howard Street.

3.1.2 Windsor Avenue

Windsor Avenue is classified both as a 'District Arterial Route' and a 'District Collector Route' by HDC. It is only the length between Heretaunga Street East and St Aubyn Street East which is classed as a District Arterial Route. The speed limit along its entire length is 50 km/h. It is a two lane road with parallel parking and cycle lanes on both sides of the road as far as Ada Street, where cyclists are encouraged to use Windsor Park for their commute.

There is traffic calming road marking near Karamu High School at the eastern end, where the road becomes Grove Road. This is approximately 750m east of the Howard Street intersection. A kea crossing is located in between the Howard Street and St Aubyn Street East intersections, including kerb extensions.

The right turn is banned at the Heretaunga Street East intersection, so traffic heading towards Hastings CBD can't use Heretaunga Street East and instead uses St Aubyn Street East and other routes to reach the CBD.

The HDC network traffic count database has numerous counts for Windsor Avenue. The most applicable count (for this report) shows a volume of 4,171 vehicles (4,500 est.), an 85th percentile speed of 50 km/h and that there are 2% HCV. The count site location is between the St Aubyn Street East and Haig Street intersections.

3.1.3 St Aubyn Street East

St Aubyn Street East is classified as a 'District Arterial Route' by HDC and has a speed limit of 50 km/h. It is a two lane road with parallel parking and cycle lanes on both sides of the road. The cycle lanes extend all the way into the CBD, where parking towards the CBD is prohibited from just south of the Hastings Street North intersection.

The give way intersection with Windsor Avenue is shown in Figure 3-3. At the limit line, there is enough room for two vehicles to queue for a left and right turn.



Figure 3-3: St Aubyn Street East / Windsor Avenue intersection (June 2015 – Google)

The HDC network traffic count database has numerous counts for St Aubyn Street East. The most applicable count (for this report) shows a volume of 6,692 vehicles (6,000 est.), an 85th percentile speed of 51 km/h and that there are 3% HCV. The count site location is between the Windsor Avenue and Terrace Road intersections.

3.1.4 Existing Traffic Count Summary

records some of the traffic count site data taken from the HDC database available on their website.

Table 3-1: HDC traffic count sites

Road	Location	Count (vpd)	Est AADT	HCV	Year
Howard Street	Near Parkvale School	1,549	1,600	3%	2008
Windsor Avenue	Between St Aubyn Street and Haig Street	4,171	4,500	2%	2013
	Between Heretaunga Street and St Aubyn Street	4,427	4,400	2%	2008
St Aubyn Street East	Between Windsor Avenue and Terrace Road	6,692	6,000	3%	2010
	Between Terrace Road and Park Road North	7,121	6,000	3%	1995

3.1.5 April 2016 Intersection Traffic Count Data

To accompany this report, intersection traffic counts for Windsor/St Aubyn and Windsor/Howard were conducted on 12th April 2016 during AM and PM peak periods. These are the two intersections that are going to be affected by the proposed development if it proceeds. In essence two back to back right turn bays (unmarked) are created by the staggered T-junction arrangement (being a left to right stagger). The kea crossing between the intersections (on Windsor Avenue) further shortens the queue space for turning vehicles.

The purpose of the counts was to provide current traffic movement counts for the SIDRA modelling of how the two intersections perform with and without the proposed development. Additional information about the counts is found in section 7.

3.1.5.1 Windsor Avenue / Howard Street

At the Windsor/Howard intersection, the busiest 15 minute period during the AM peak was 08:15-08:30 with 318 vehicles either driving along Windsor Avenue or turning in/out of Howard Street. This time period would align with the common time for road users to be either commuting for work or dropping their children off at Parkvale School for the day. The busiest one hour period was 07:45-08:45 with 972 vehicles.

The longest queuing on the Howard Street leg was during the 08:15-08:30 period, where nine vehicles queued to turn right and seven vehicles queued to turn left. On Windsor Avenue, the longest queue length was nine right turn vehicles queuing between the 08:30-08:45 period (eight queued during 08:15-08:30 also).

Field observations recorded during the morning survey reveal the following:

- *Pedestrians are using the designated crossings.*
- *Kea crossing holds all legs when in use (>20 vehicles stopped).*
- *Many cars stopping on Windsor Avenue (east origin through movement) to give Howard turning traffic a chance to move.*
- *Due to the splitter island recently installed on Howard Street - one car turning right out of Howard Street held queue for approximately three minutes, no room for left turn while this was happening due to parked cars on Howard¹.*
- *Right turn queue from Windsor into Howard blocks right turn from Windsor into St Aubyn.*

¹ Parking is permitted too close to the intersection; recommend that a couple of parking spaces are removed so that left-turn traffic is not blocked by one right-turn vehicle.

The busiest PM 15 minute period during the PM peak was 17:00-17:15, with 160 vehicles either driving along Windsor Avenue or turning in/out of Howard Street. This period coincides with commuters travelling home from work. The busiest one hour period was 16:30-17:30 with 586 vehicles passing through the intersection. Queuing was not a major issue in the evening, as the kea crossing was not in use.

Field observations recorded during the evening survey reveal the following:

- *No school traffic and kea crossing closed.*
- *No vehicles parked on Howard Street near the give way, so vehicles able to split into left/right turning lanes at give way.*

3.1.5.2 Windsor Avenue / St Aubyn Street East

At the Windsor/St Aubyn intersection, the busiest 15 minute period during the AM peak was 08:15-08:30 with 363 vehicles either driving along Windsor Avenue or turning in/out of St Aubyn Street East. This time period would align with the common time for road users to be either commuting for work or dropping their children off at Parkvale School for the day. The busiest one hour period was 07:45-08:45 with 1,134 vehicles.

The worst queuing observed at this intersection was those vehicles on Windsor Ave who were stopped by the kea crossing situated between the St Aubyn and Howard intersections. The longest queue recorded was thirteen right turn vehicles (for St Aubyn) queuing between the 08:30-08:45 period. This was followed by ten eastbound vehicles queuing on Windsor Avenue, which would block the right turn traffic for St Aubyn (on Windsor).

The longest queue on the St Aubyn St East leg was during the 08:30-08:45 period, with four vehicles queued to turn left onto Windsor Avenue.

Field observations recorded during the morning survey reveal the following:

- *Cyclists using cycleways, but not a large number.*
- *Pedestrian crossing near Heretaunga Street was the most frequently used.*
- *A few jay-walkers but not many.*
- *Truck turning paths into and out of St Aubyn crossing over two lanes.*
- *Cars turning right from St Aubyn to Windsor can experience long waits.*
- *Children crossing St Aubyn at intersection.*

The busiest PM 15 minute period during the PM peak was 17:00-17:15, with 217 vehicles either driving along Windsor Avenue or turning in/out of St Aubyn Street East. This period coincides with commuters travelling home from work. The busiest one hour period was 16:30-17:30 with 824 vehicles passing through the intersection. Queuing was not a major issue in the evening, as the kea crossing was not in use.

Field observations recorded during the evening survey reveal the following:

- *Some creep out by right turn vehicles from St Aubyn (possibly due to car parked outside No. 308 Windsor - No Parking lines could be installed).*
- *Enough width on Windsor for turning bays.*
- *Cyclists crossing Windsor at pedestrian crossing and cycling on footpath toward school.*

In summary the traffic surveyors stated that the kea crossing on Windsor Avenue was the main cause of the queues that developed, particularly so during a 30 minute period. When the crossing was not in use the traffic flowed much better, and queues returned to more normal numbers of two or three vehicles at most. It should also be noted that right turn vehicles on Windsor Avenue did not often obstruct through traffic, as they were able to pass on the left by crossing over into the cycle lane and parking spaces (if no parked vehicles were present).

3.2 Public Transport

The Hawkes Bay Regional Council (HBRC) bus information website shows there are three bus

services which operate within the vicinity of the site, being:

- Route 11 Express (Napier > Hastings > Havelock North > Hastings > Napier);
- Route 17 (Hastings > Parkvale > Akina > Hastings);
- Route 21 (Hastings > Havelock North > Hastings).

Route maps are presented in Appendix A.

Route 11 is an express route with eight stops in each direction. The stop closest to the Howard Street development is 1100 Heretaunga Street (opposite Mac's Fish Supply), with the route travelling along Havelock Road.

Route 17 is a local Hastings circular service that has a bus stop located at 209 Terrace Road. This route only travels in a clockwise direction.

Route 21 is a local Hastings to Havelock North return service. The stop closest to the Howard Street development is 1100 Heretaunga Street (opposite Mac's Fish Supply), with the route travelling along Havelock Road.

Figure 3-4 outlines where the routes drive past the proposed development and the two nearest bus stops to the development.

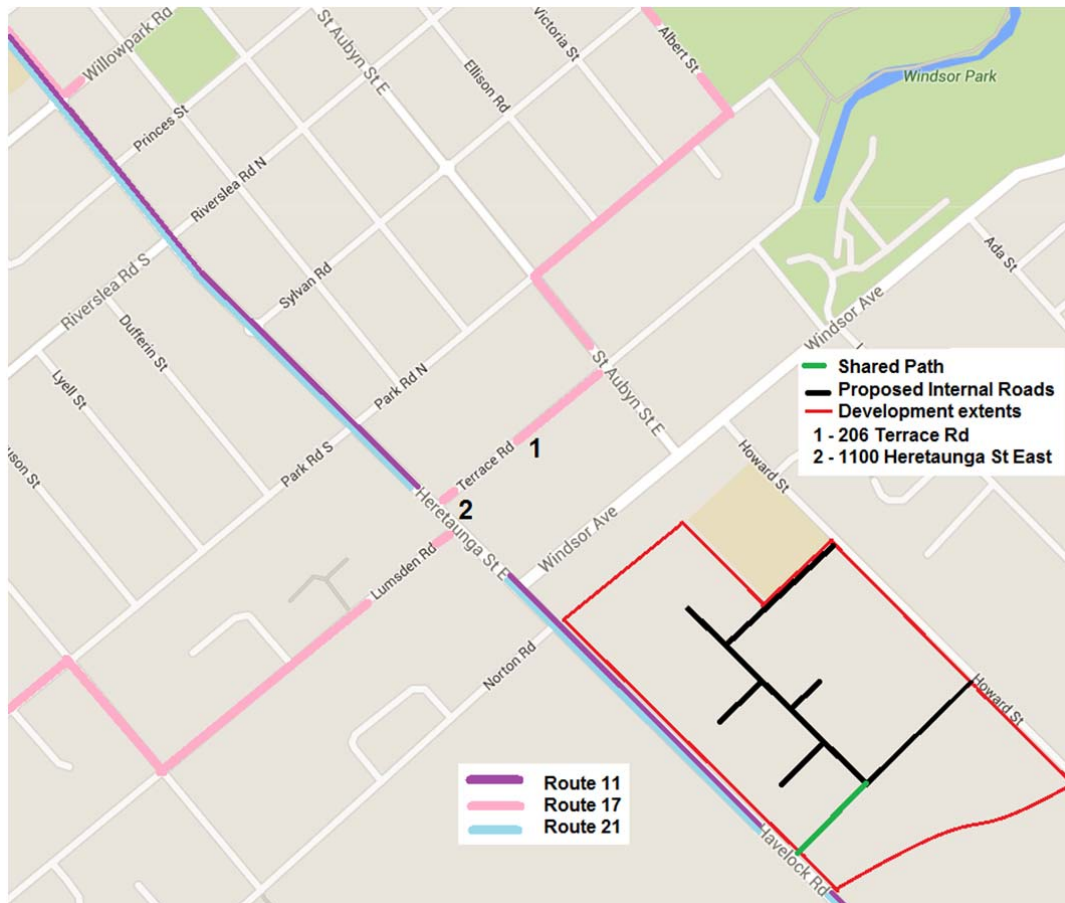


Figure 3-4: Nearby bus services and bus stops

3.3 Pedestrian and Cycle Routes

The local residential streets are well serviced by footpaths and cycle facilities. The residential areas adjoining the site generally provide footpaths for pedestrians on both sides of the road. However an adjacent section of Howard Street has no footpath on the western side, due to the semi-rural nature of the road.

As indicated below there are good existing pedestrian provisions surrounding the development area:

- Howard Street – footpaths on both sides of the road until approximately halfway down the development frontage, where the western footpath ends and continues on the eastern side as far south as the Reformed Church of Hastings;
- Windsor Avenue – footpaths on both sides of the road;
- St Aubyn Street East – footpaths on both sides of the road;
- Heretaunga Street East – footpaths on both sides of the road;
- Havelock Road – a 3.0m wide shared path on both sides of the road, all the way to Havelock North.

As indicated below there are good existing cycling provisions surrounding the development area:

- Howard Street – no cycling facilities are currently provided;
- Windsor Avenue – on-road cycle lanes on both sides of the road;
- St Aubyn Street East – on-road cycle lanes on both sides of the road;
- Heretaunga Street East – on-road cycle lanes on both sides of the road;
- Havelock Road – a 3.0m wide shared path on both sides of the road, all the way to Havelock North.

The western side of the Havelock Road shared path was opened in March 2016, to accompany the previously completed eastern side shared path. Provision of the shared path facilities was one of the items to arise from the 2010 Corridor Management Plan (CMP) for Havelock Road.

There are no current pedestrian or cycle facilities within the proposed development site due to the site presently being mainly rural land.

3.4 Road Safety

Investigation of the NZTA Crash Analysis System (CAS) for the five year period 2011 to 2015 revealed 52 reported crashes on the surrounding road network. The area investigated is shown in Figure 3-5 with the green area showing the approximate extents of the proposed housing development.

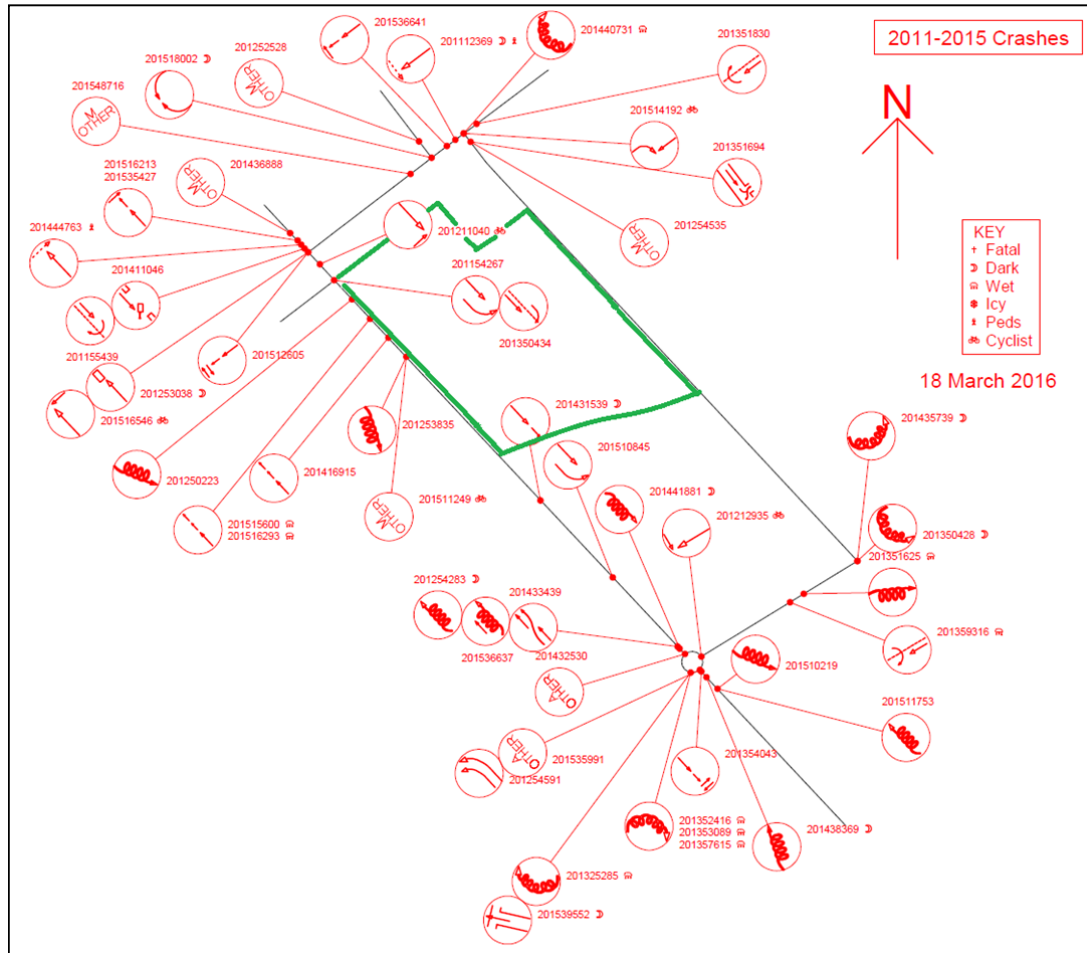


Figure 3-5: 2011-15 Crash Map

Of the overall 52 crashes there were no fatalities, two serious, 15 minor and 35 non-injury crashes. Overall the crash history is at the lower end of the severity scale, with only 4% of crashes resulting in F+S crashes (with 2 deaths and serious injuries). The following sections consider each of the adjoining roads.

3.4.1 Howard Street

The extent of the analysis is from the intersection with St Georges Road to the intersection with Windsor Avenue. There have been four non-injury crashes reported on Howard Street. Two were loss of control crashes at the St Georges Road intersection (traveling too fast) and the other two crashes were manoeuvring crashes 20m south of the Windsor Avenue intersection (most likely associated with parking around the school).

3.4.2 Windsor Avenue

The extent of analysis is from the intersection with Havelock Road to Howard Street. There have been three minor injury crashes and four non-injury crashes. Two of these crashes are at the Howard Street intersection with three other crashes in the immediate vicinity and one crash occurred at the Heretaunga Street East intersection. There are no prevailing crash trends along this road and the crashes are all of a minor nature.

3.4.3 St Aubyn Street East

The analysis extent is from the intersection with Windsor Avenue and just south of the intersection with Terrace Road. There have been two crashes reported, resulting in one serious injury and one

non-injury crash. The serious crash occurred at the intersection with Windsor Avenue, where a vehicle cut the corner and crashed head-on into another vehicle. The driver of the vehicle cutting the corner returned a positive alcohol test.

3.4.4 Heretaunga Street East

The analysis extent is from just north of the intersection with Windsor Avenue to the Norton Road intersection. This is only a short approximately 110m section and is the very tail end of Heretaunga Street East which runs right into Hastings CBD.

There have been eleven crashes reported, resulting in four minor injury and seven non-injury crashes. One crossing (HA type) crash involved a cyclist and another crash involved a pedestrian crossing the road (NA type). There were three manoeuvring crashes just west of the Windsor Avenue intersection, while there were two crashes of each of the following types; rear-end (Type F), turning vs same direction (Type G) and crossing no turns (Type H).

3.4.5 Havelock Road

The analysis extent is from the intersection with Norton Road to just south of the roundabout with St Georges Road. There have been 25 crashes reported, one serious injury, eight minor injury and 16 non-injury crashes. The serious crash occurred 50m south of the roundabout with St Georges Road, where the driver lost control of the vehicle due to an illness (e.g. heart attack).

The most common crash type is loss of control crashes on straight roads (Type C) with seven crashes; of those one was a serious crash and one was a minor crash. Five of these crashes are within 50m of the St Georges Road roundabout, two were caused by illness and two were drunk drivers. At the northern end of Havelock Road there are six other crashes with three of these rear-end queue minor injury crashes (Type FD).

Overall there are 17 crashes within 50m of the roundabout, which is the most common crash location of the area under investigation. Havelock Road has the greatest AADT volume of all the roads, so it is expected that the greatest number crashes would occur along this road.

3.4.6 St Georges Road

The analysis extent is from the roundabout with Havelock Road to the intersection with Howard Street. There have been three non-injury crashes reported, with no commonalities.

4 Planned Transport Improvements

4.1 Background

There are no significant transportation projects identified in the vicinity of the proposed development, either now or in the near future. The HDC forward work plan does, however, include standard renewal work such as sealing, footpaths, kerb & channel, drainage and minor safety improvements. This is work that would normally be expected.

5 Nearby Plan Changes and Urban Growth Areas

There are no nearby plan changes that have been recently granted or are waiting to be heard before Hastings District Plan Hearings Committee. In July 2015 a hearing was held to review the request to rezone land bound by Howard Street, Ada Street, Kathleen Street and the natural watercourse at its southern extents. This application was rejected by the committee as rezoning the land would be in conflict with the Hawke's Bay Regional Policy Statement and would have potential to adversely affect the implementation of the region's growth strategy (as well as seven other reasons).

Appendix 2 of the Proposed District Plan² shows no other areas nearby identified as 'Residential

² As Amended by Decisions 12 Sept 2015 (by Section) and Decision Reports

Urban Growth Areas', which does not include the Howard Street development as an identified location. However on Appendix 1 of the proposed District Plan, the Howard Street development is shown as well as other locations on the western side of the suburb of Akina as 'Identified Growth Areas' in the Heretaunga Plains Urban Development Strategy (HPUDS). These other locations appear to be west of Copeland Road.

6 Proposed Plan Change – Howard Street

6.1 Background

Hastings District Council has brought forward the timing of the potential rezoning of land around Howard Street into the current 10 year plan (2015-2025). Currently this is zoned as 'Plains' and the potential rezone is to residential land. Should the rezoning occur, then 19ha of Howard Street land is proposed to be converted into 285 dwellings over the next 10-20 years.

The development will be bordered by Parkvale School, Howard Street, Havelock Road and the natural watercourse to the southwest as shown in Figure 6-1. Note that the full size of the development is not shown on the diagram; the purple shading should extend to the stormwater detention zone (green hatching).

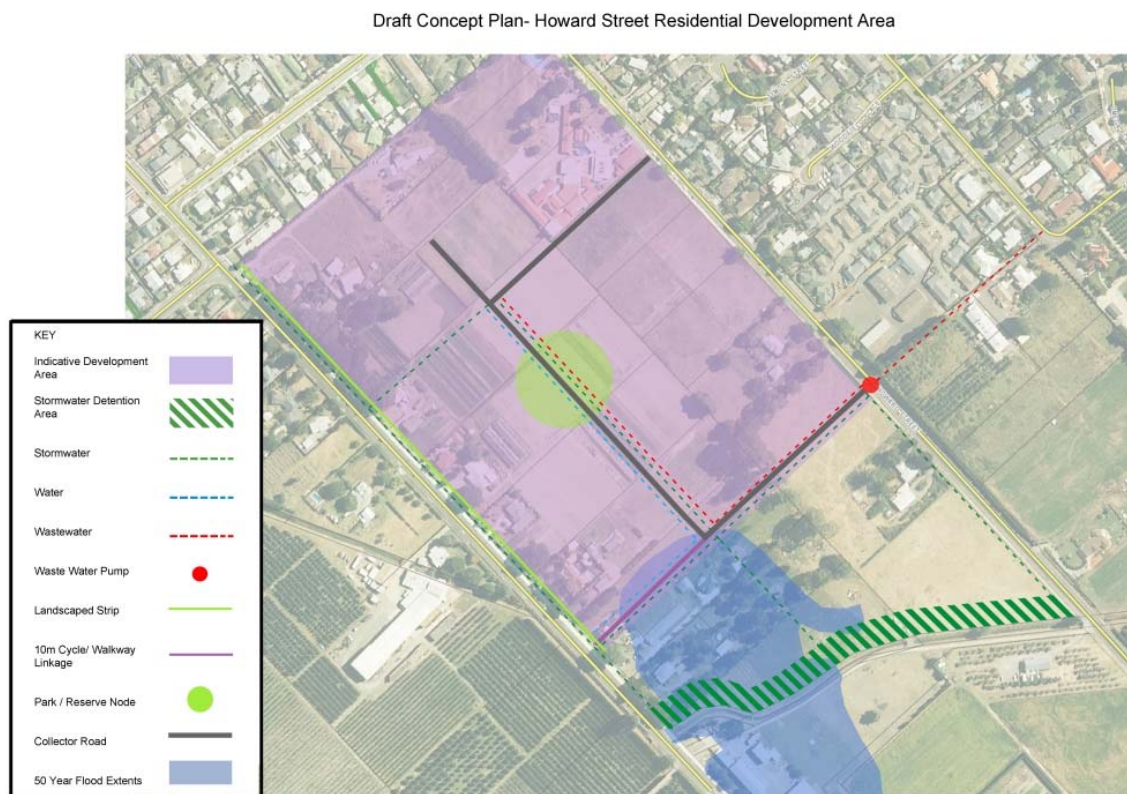


Figure 6-1: Draft concept plan

6.2 Development Road Network

Figure 6-1 shows the draft concept plan for the proposed development and the main internal roads. It should be expected that an additional local access road branches off the southern connection (to Howard Street) to access the extended area towards the stormwater detention area. Any internal roads are expected to have a maximum 50 km/h speed limit, notwithstanding the ability to have lower speed limits (e.g. 40 km/h) applied.

Key attributes of the network are:

1. Two access points onto Howard Street to reach the internal network of the development. The main road throughout the development is likely to be classed as a local access road.
2. No new vehicular access onto Havelock Road along the southern extents of the development. There is however a cycleway connection proposed at the southern corner of the development.

The typical cross-sections proposed for the roads within the development have not been confirmed at this stage, however it is expected they would meet the requirements under HDC's Engineering Code of Practice. The typical urban road layout from the code is shown in Figure 6-2. However, the preference should be to continue using shared paths, rather than on-road cycling facilities, and have these connect up with the shared path on Havelock Road.

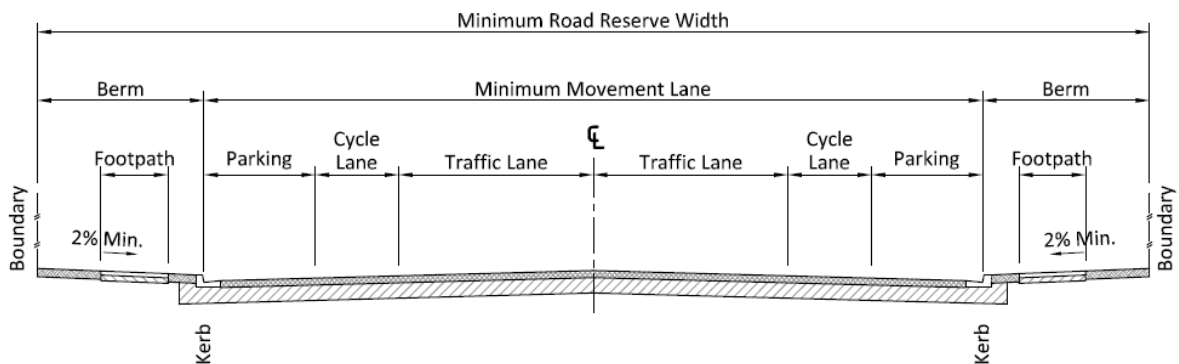


Figure 6-2: Typical Urban Road Cross Section: Drawing No. C1

One of the main aspects of the development's road network is not to have any direct vehicular access onto Havelock Road. Havelock Road currently has an AADT of approximately 19,000 vehicles per day. It is already close to reaching saturation levels, so additional traffic and new intersections are likely to cause congestion, particular in the future. It is important however, to provide new pedestrian and cycling linkages to the shared path on Havelock Road. The concept plan shows only one new shared path connecting to Havelock Road, whereas a second connection closer to Hastings would be hugely beneficial, as it would provide a better provision for pedestrians to then access the bus stop at 1100 Heretaunga Street East. Pedestrians are unlikely to walk south to the one shared path and then walk north up Havelock Road to then continue their journey.

We do not envisage any new bus routes being required, however that does not preclude minor changes to Route 17 in order to drive nearer the new development.

An initial drawing of the first 70 dwellings has been produced as shown in Figure 6-3. This provides an indicative layout that would be adopted throughout the entire development. These 70 dwellings would have their own separate access onto Howard Street (as shown) and would not utilise any of the internal roads as proposed in Figure 6-1. An error in the drawing shows no space available between the school and the dwellings to provide for the northern most local access road. It is understood that Lot 1, as shown, should be located immediately southeast of the school to provide the space needed for the northern local access road, including cycling and pedestrian access. This would slide Lot 2 in a southeast direction.



Figure 6-3: Plan view from NZ0415104-PL-C100-SCHEME-03-C101_r1

As shown on Figure 6-3 there is a third access way onto Howard Street proposed, aside from the two main local road access ways.

The first main access way is near the school, as mentioned, which may need a right-turn bay on Howard Street as it may experience a greater volume of traffic turning in (from Hastings direction) due to it being the first access way traffic will approach. The second main access way, to the south of the development, is close to the 50 km/h / 80 km/h boundary. Speeds of traffic coming from the south will need to be monitored; this could mean that threshold treatments into the 50 km/h area might be necessary. Finally the third access into the gated community, as shown in Figure 6-3, might also need a right-turn bay.

7 Transportation Modelling

No area-wide based modelling was undertaken for this report, instead an assessment of the two intersections off Windsor Avenue (St Aubyn Street East and Howard Street) in Figure 7-1 has been undertaken in SIDRA. Traffic counts were collected by MWH on 12 April 2016 during the AM and PM periods and these figures were used as the base traffic volumes for the SIDRA analysis. The AM counts were recorded between 07:30-09:30 and the PM counts recorded between 16:00-18:00.

Consideration should be given to modelling the downstream effects of the increased development traffic, especially heading north on St Aubyn Street East as it heads towards the Hastings CBD. However that is outside of the scope of this report.

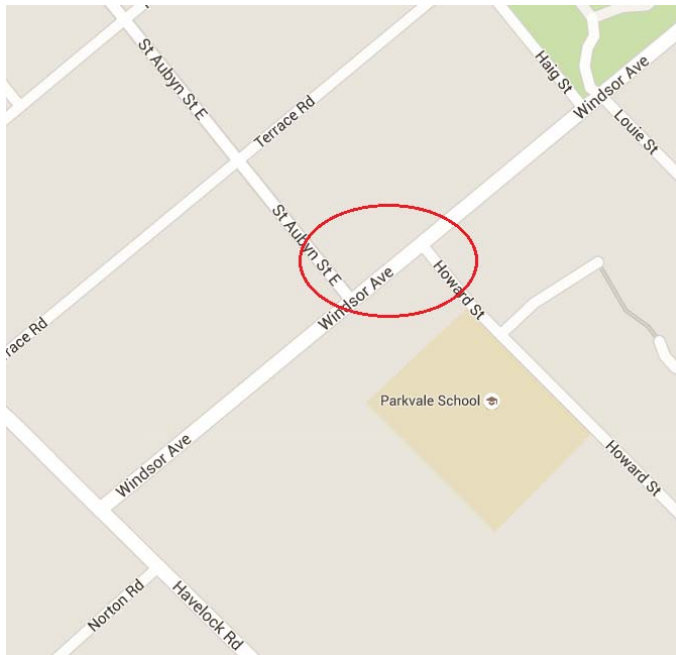


Figure 7-1: Extent of SIDRA analysis

St Aubyn Street East continues northwest until it reaches the Hastings CBD. It is expected that a large proportion of the vehicles generated by the proposed Howard Street development will use the staggered T-intersection to access and return from Hastings CBD.

Models were created for the AM and PM base scenarios using the peak hour counts captured in the April 2016 traffic survey. The second scenario for the AM and PM peaks was to include the traffic generated by the proposed development onto the base data. No traffic growth was applied as the second scenario was not modelled on a future date, when the development might be expected to be fully occupied.

7.1 Trip Generation

To calculate the number of trips generated by the 285 dwelling development, trip generation rates from Table C.1 of the NZTA Research Report 453: Trips and Parking Related to Land Use were used. The two most relevant residential dwelling trip generation rates are inner suburban dwelling (a 7.2.1 dwelling) and outer suburban dwelling (a 7.2.2 dwelling). Their respective trip rates (85th percentile) are outlined in :

Table 7-1: RR 453 Table C.1 dwelling trip generation

Land Use Category	Peak Hour Trips (veh/hr/unit)	Daily Trips (veh/day/unit)
Dwelling (Inner Suburban)	1.2	10.9
Dwelling (Outer Suburban)	0.9	8.2

The outer suburban classification may not readily apply to a city the size of Hastings; it is more aligned for larger centres e.g. Auckland, Wellington and Christchurch.

For the purposes of this report a peak hour trip generation of 1.0 veh/hr/unit and a daily trip rate of 10 veh/day/unit was used.

The Report 453 does not break down the peak hour period to AM or PM generation rates. Looking at the Trips Database Bureau (TDB) database (Jan 2015 version) and filtering the sites in the table that best apply to this situation, an average AM trip generation of 1.07 veh/hr/unit and an average PM trip

generation of 0.99 veh/day/unit are produced. Therefore a trip generation of 1.0 veh/hr/unit for the proposed development appears to be an appropriate value to use. The daily trip rate of the filtered TDB sites equated to 9.5 veh/day/unit, which matches well with the 10 veh/day/unit proposed.

7.2 Trip Distribution of the Proposed Development

For the purposes of this report the split of the AM traffic generated by the proposed development shows 80% is leaving the development and 20% is attracted to it. Of the 80% leaving the development, 75% is heading towards Hastings and the remaining 25% will use Howard Street to head towards Havelock North. Of the 20% attracted to the development, 75% was travelling from Hastings and the remaining 25% from Havelock North. At the two intersections in question, the traffic was distributed by the same percentage splits as recorded by the April 2016 AM traffic counts.

The split of the PM traffic generated by the proposed development shows 30% is leaving the development and 70% is attracted to it. Of the 30% leaving the development, 75% is heading towards Hastings and the remaining 25% will use Howard Street to head towards Havelock North. Of the 70% attracted to the development, 75% was travelling from Hastings and the remaining 25% from Havelock North. Again the traffic was distributed by the same percentage splits as recorded by the April 2016 PM traffic counts.

7.3 Base Scenario AM Peak

The AM peak hour surveyed was recorded as 07:45-08:45 with 972 vehicles passing through/by the Windsor/Howard intersection and 1134 vehicles passing through the Windsor/St Aubyn intersection. A one hour peak SIDRA Network model linking the two intersections was created and an intermediary link with a signalised pedestrian crossing was included to attempt to model the kea crossing which is located between the two intersections (no kea option available). The kea crossing was only active during the AM peak and not the PM peak.

The SIDRA model showed that the two intersections performed well in the AM Peak. The longest queues which developed were on Windsor Avenue with 48m westbound (7 vehicles) and 38m eastbound (5.5 vehicles). On Howard Street the queue was 10m (1.5 vehicles) and on St Aubyn the queue was 17m (2.5 vehicles).

These queue lengths do not correlate with the queues observed in the field by the traffic surveyors in section 3.1.4. However they observed the queuing to be at its worst over a 30 minute period and fairly non-existent either side of that. We believe that the SIDRA model is compensating by distributing the traffic more evenly over the peak hour, which would smooth out the 30 minute period when the surveyors observed greater queuing. A 30 minute peak period was not modelled by this investigation. We would advise that it is modelled to see whether it would better reflect the observations in the field. Further to this, we are not 100% confident in SIDRA's ability to fairly represent the interaction between the intersections and the kea crossing. Ideally, using the Council's network model to analyse the impacts of the development would be a better approach.

7.4 Base Scenario PM Peak

The PM peak hour was recorded as 16:30-17:30 with 586 vehicles passing through/by the Windsor/Howard intersection and 824 vehicles passing through the Windsor/St Aubyn intersection. This is much lower overall than during the AM peak hour (2,106 movements vs 1,410 movements). A one hour peak SIDRA Network model linking the two intersections was again created. On this occasion the kea crossing was not included as it was not in use when the traffic survey started at 16:00.

The SIDRA model showed that the two intersections performed well during the PM peak. The longest queues which developed were on Windsor Avenue with 6m westbound (1 vehicle) and 5m eastbound (1 vehicle). This is fairly consistent with the queue lengths of 1-2 vehicles observed in the field for Windsor Avenue. SIDRA however had near zero queue distances for traffic on St Aubyn Street East and Howard Street, which was inconsistent with the 1-3 vehicles observed queuing on Howard Street and 2-3 vehicles observed queuing on St Aubyn Street East.

In all, the fairly free flowing vehicle movements observed in the field were replicated by SIDRA.

7.5 Proposed Development Scenario AM Peak

The same AM peak hour of 07:45-08:45 was modelled with an additional 214 vehicles included, which are vehicles either generated from or attracted to the proposed development via Hastings. All other generated or attracted traffic (71 vehicles) to/from Havelock North was modelled as using Howard Street south of the intersections under investigation, and therefore not included in the intersection analysis. The same one hour peak SIDRA Network model was used as the AM Base.

The SIDRA model showed the St Aubyn Street East intersection performing well, as only an additional 19 vehicles were added to the link and 19 more vehicles travelling east on Windsor Avenue to oppose them. The longest queue now modelled is 31m (4.5 vehicles) on Windsor Avenue traffic, which affects both right turn for St Aubyn Street East and westbound through traffic. This has nearly doubled from 17m in the base scenario

The Howard Street intersection does not perform as well, with a 71m queue (10 vehicles) developing on Howard Street, due to the 171 additional vehicles generated by the development heading towards Hastings. The average delay has ballooned from 9 seconds in the base model to 29 seconds in this model.

The queues to Windsor Avenue traffic caused by the kea crossing have increased eastbound from 48m to 65m (7 vehicles to 9 vehicles) and westbound from 38m to 46m (5.5 vehicles to 6.5 vehicles). With the additional 214 vehicles using the roads during the AM peak hour, we would expect the scenario in reality to be more congested than SIDRA has suggested. This leads back to comments stated in section 7.3 about the SIDRA results not aligning with the observations in the field.

7.6 Proposed Development Scenario PM Peak

The same PM peak hour of 16:30-17:30 was modelled with an additional 214 vehicles included (using the same trip generation rate of 1.0 veh/hr/unit), which are vehicles either generated from or attracted to the proposed development via Hastings. All other generated or attracted traffic (71 vehicles) to/from Havelock North was modelled as using Howard Street south of the intersections under investigation, and therefore not included in the intersection analysis. The same one hour peak SIDRA Network model was used as the PM base.

The SIDRA model showed that the two intersections performed well during the PM peak. The longest queues which developed were on Windsor Avenue with 12m westbound (2 vehicles) and 6m eastbound (1 vehicle). Again SIDRA had near zero queue distances for traffic on St Aubyn Street East and Howard Street, which is not thought to be realistic given the increase in volumes and the existing queues surveyed in the field for the base PM model.

8 Effects on the Transportation Network

8.1 Transportation Modelling Summary

The base models in SIDRA did not reflect very well what was observed in the field and hence have not been over-analysed by this report. In particular the AM base model did not reflect the queues observed in the field, in particular a 30 minute period mentioned by the traffic surveyors where the kea crossing on Windsor Avenue was the main cause of the queues which generated and then had a flow-on effect to the two intersections. As suggested earlier the HDC network model should produce different results, but it was not possible to be utilised for this report.

The AM model including the development showed the Howard Street link increasing from a 7m average queue length to 71m, due to the 214 vehicles exiting the proposed development and heading towards Hastings. We believe, given the existing queues observed in field, that the negative impact would be greater than the 71m queue calculated and that this would become a congestion problem on the network. Some of the negative effect might be dampened if commuters decided to start work earlier, in an effort to avoid the AM peak traffic induced by Parkvale School.

As the PM peak traffic was much lower in the base model than the AM model (700 less vehicle movements), it performed well in SIDRA. When the additional 214 vehicles generated by the development were included, the model did not deteriorate by much at all. As the traffic surveyors did not comment on any notable queuing issues observed during the PM surveys, we must assume that the intersection should be able to cater for the evening traffic sufficiently. This is particularly as it does not suffer from the same kea crossing problem as experienced in the AM peak period.

8.2 Future Road Safety Impacts

If the proposed development was to proceed, crash numbers would expect to increase along Howard Street as the traffic volume increases. Increases would therefore also be expected at all intersections that surround the development as well. This is particularly at the two intersections along Windsor Avenue (St Aubyn Street East and Howard Street), where increased vehicle volumes through these intersections would mean an increase in the number of conflict interactions between opposing vehicles and hence the likelihood of increased crashes.

The location of the kea crossing on Windsor Avenue would need to be reviewed. It is already causing queuing problems in the base scenario, so these queues would only become worse if the development was to proceed.

Howard Street would need to be upgraded to incorporate cycling facilities which do not currently exist. In addition to this, the car parking near the Windsor Avenue intersection limit line should be reviewed as well. If approximately two car parks were removed it would help increase the capacity of the intersection, as two vehicles (right and left turning) could then wait at the limit line and queue back three or more vehicles deep. As observed in the field, there were long delays experienced during the existing AM situation.

9 Strategic Planning Considerations

A full review of strategic planning documentation has not been undertaken for this report. However the proposed development aligns well against the Heretaunga/Havelock CMP, by not creating an additional access point onto Havelock Road. This road is currently congested and forecasted to get busier, so it is unlikely to cope well with an additional 150-250 vehicles trying to use it during the peak hours.

10 Summary and Recommendations

This report investigated the traffic impacts of the proposed Howard Street greenfield residential development of 285 dwellings that includes three new access ways onto Howard Street. The data provided on the proposed development was of a high level nature and an in-depth review of the internal road network has not occurred. Instead this report focused on the impact of the traffic generated by the proposed development (when fully occupied) on the Windsor/Howard and Windsor/St Aubyn Street East intersections during the AM and PM peak periods.

The traffic surveys conducted in April 2016 showed there to be an existing queuing problem on Windsor Avenue during the AM peak period, caused in most part by the kea crossing in between the two T-junctions. The knock on effect of Windsor Avenue traffic queuing was the two side road intersections would sometimes become blocked by this traffic. These queues soon disappeared once the kea crossing was not activated. The SIDRA model however, was not able to replicate the same problems and if further traffic impact analysis was required, the HDC network model would be a better tool to assess the impacts to the wider network (not just the two intersections). With an estimated 214 additional vehicles using the two intersections when the development was fully occupied, it is expected that existing queues on Windsor Avenue would only deteriorate. The best method to mitigate this would be to relocate the kea crossing to the east of the Howard Street intersection or to the west of the St Aubyn Street East intersection.

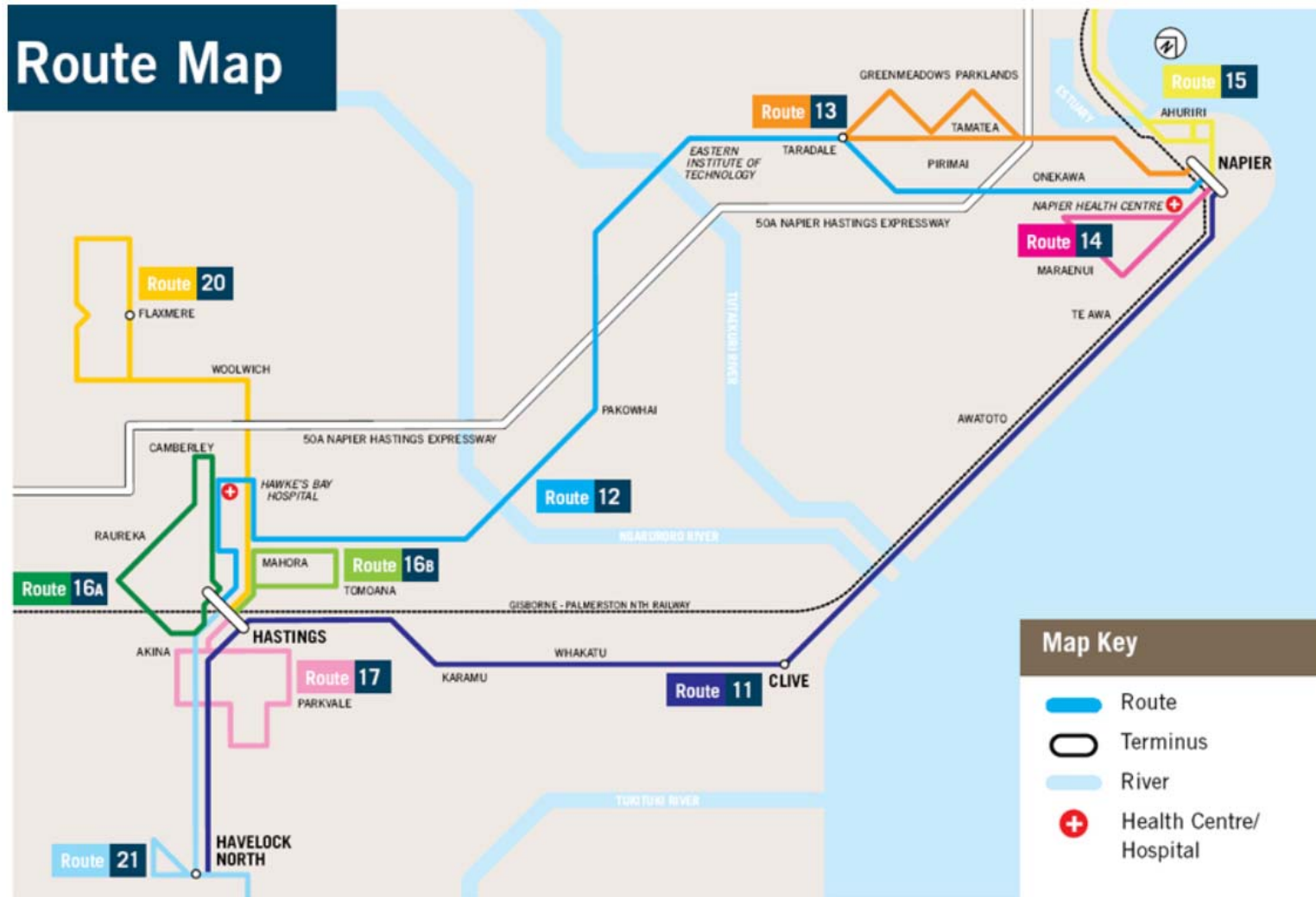
The PM peak period posed much less of a concern, as the afternoon traffic and pedestrian generated

by Parkvale School has dispersed well before 16:00.

There are three main recommendations raised by this investigation:

1. The need for two shared path facilities (rather than one) that connect from the proposed development to the Havelock Road shared path (at the northern and southern ends of the proposed development).
2. The location of the kea crossing on Windsor Avenue would need to be reviewed. It is already causing queuing problems in the base scenario, so these queues would only become worse if the development was to proceed. Options include moving it east of the Howard Street intersection or west of the St Aubyn Street East intersection. This would need to be discussed with the school as either option would disadvantage some school children.
3. School crossing and parking at northern end of Howard Street. There is a need to eliminate two parking spaces near the Windsor Avenue intersection, to allow more left-turn vehicles to access the limit line and not be delayed by a right-turn vehicle (lower volume movement). Also it is important to monitor the behaviour of pedestrians at the new pedestrian island crossing at this intersection, particularly in the morning when any development traffic is going to have the largest impact combined with school traffic. If there are concerns with traffic speeds near the school, a 40 km/hr zone should be investigated to operate prior to and after school hours.

Appendix A HBRC Public Transport Routes



HAWKES BAY

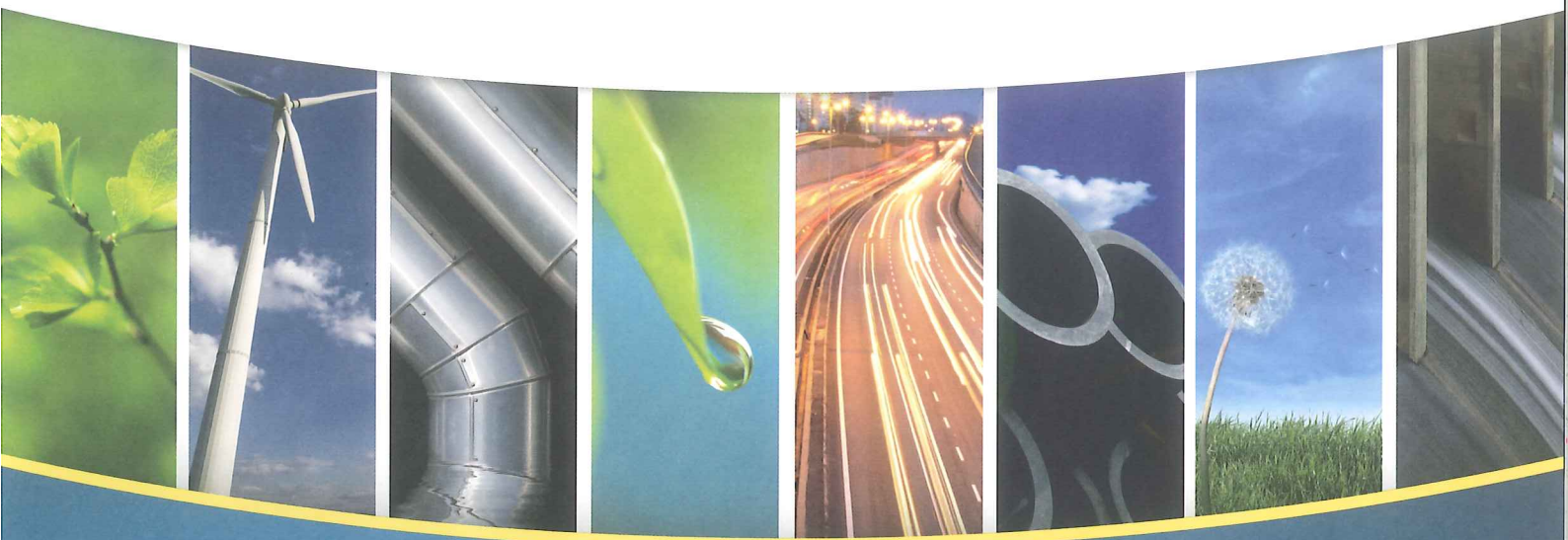
1st Floor, 100 Warren Street South, Hastings 4122

PO Box 1190, Hastings 4156

TEL +64 6 873 8900

FAX +64 6 873 8901

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